

## DIET COMPOSITION OF FLEDGLINGS AND ADULTS SPANISH SPARROWS *PASSER HISPANIOLENSIS* IN ORAN AREA AT WESTERN OF ALGERIA

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### ABSTRACT

The diet of fledglings and adults Spanish sparrow *Passer hispaniolensis* was realized in farmland area in Oran. Our study revealed the presence of both animal and plants parts with a dominance of animal part for all age categories and adults. The relative frequency of orders of arthropods was revealed the presence of 11 orders with a dominance of Orthoptera prey for fledglings with age from 1 to 3 days (51 preys, 50.5%) and fledglings with age from 4 to 6 days (89 preys, 40.5%). The Coleoptera and Hymenoptera made up the most consumed preys by the fledglings of with age from 7 to 9 days (62 preys, 34.1% each). The Coleoptera (36 preys, 34.3%) was most consumed by fledglings with age from 10 to 12 days. Adults prefer to feed much of Hymenoptera prey (63 preys, 54.8 %) and Coleoptera prey (24 preys, 20.9%). The dominant species in the diet of fledglings Spanish sparrows was *Pezotettix giornai* with 31.7 % (1 to 3 days), *Calliptamus* sp. With 16.8 % (4 to 6 days), *Messor barbara* with 33.5 % (7 to 9 days) and *Anisoplia* sp. with 16.2 % (10 to 12 days). For adults *Messor barbara* was the most dominant species with 48.7 %.

**KEYWORDS:** Diet, Spanish Sparrows, *Passer hispaniolensis*, Oran, Algeria

### INTRODUCTION

Among the pests granivorous, the birds especially sparrows was considered a harmful species causing the significant damage. This is enough to justify the studies undertaken on harmful bird species in agricultural areas. However, birds were considered pests as such that when the havoc they cause to become financially significant (Sefraoui, 1981). These damages occur at various vegetative stages from planting to ripening grain. Indeed speak of sparrows is alluding to the ravages they may commit in different crops, including cereals. Sparrows are among other insects with one of the largest in the world animal groups. But among them, some species are harmful to crops (Bellatreche, 1986). Spanish Sparrow *Passer hispaniolensis* was one species of sparrow is considered an agricultural pest in Algeria. This species is very common in Oran in western Algeria (Metzmacher, 1985). It is also common in the highlands. Bellatreche (1979, 1983) and Koudjil (1982) emphasize the presence of Skip hispaniolensis in Mitija. In winter, it is found from the Tell into the Oasis of the Sahara. A large number of individuals through Saharien Atlas Mountains in Ksours (Blondel, 1962 cited by Ledant et al, 1981). It is also referred by Boukhemza (1990) in Timimoun and Tafedest near Tamanrasset by SEDDIKI (1990). Ould Rabah and Doumandji (2005) reported 114 colonies of Spanish sparrows were observed in the operation of the destruction of nest realized by the National Institute for the Protection of plants (INPV) in 2005. These colonies are located in 12 provinces of the country, two provinces of the East (Guelma and Oum El Bouagui) and 10 provinces of the West (Chlef, Tissemsilt Tiaret Relizan, Mostaganem, Mascara, Oran, Ain Temouchent, Tlemcen and Sidi Bel Abbes).

Bortoli (1969) noted that a one sparrow can cause a loss harvest estimated at 300 grams of cereal grains. It reveals that a population of 50 million sparrows would consume 150,000 quintals (2-5 % of the harvest). The damage can sometimes reach 30% of certain crops in cereals areas (Berville and Gauthier, 1961). Madagh (1996) reported that the attacks were noted especially during the 3rd last developmental stage of cereals including wheat and barley. According to this author the damage caused by the sparrows in a farmland area near the Mefteh appear to be increasing but remain mostly below 5 quintals per hectare for wheat and 6 quintals per hectare for barley. In Oran Metzmacher and Doubois (1981) reported that the damage to the grain are usually caused by the Spanish sparrow and the average percentage loss is estimated at 15.2% for barley and 5% for wheat. On vegetable crops damage was caused on a different stage of the plant. The losses caused on tomato reach 22 % which is 13 quintals per hectare (Madagh, 1996).

The study of the feeding behavior of the sparrow was carried out by many authors in Europe; among them we can mention those Siriez (1966), Cramp et al. (1994) and Marks et al. (2003). In Algeria, several studies have focused on the diet of Spanish, domestic and hybrid sparrows (Bellatreche 1979, 1983; Koudjil, 1982; Metzmacher, 1983; Madagh, 1996; Behidj, 1997; Bendjoudi, 1999; Akrouf, 1999; Ait Belkacem, 2000; Akrouf et al, 2002; Ould Rabah, 2002; Berket, 2010; Guezoul et al, 2011 and Otmani, 2013). These studies have gaps in the knowledge of the biology and behavior of sparrows which seems essential to choose the best way to fight and to be able to act at the right time. This manuscript focuses on the study of the diet of adults and fledglings sparrows according to their age in order to specify the time at which the agents of plant protection should begin the destruction of nests and chicks order to achieve the best results.

## STUDY AREA

Our study was conducted in Oran plain ( $35^{\circ} 44' N$ ,  $0^{\circ} 39' W$ ) in the extreme northwest of the Algeria. This region was located at 450 km west of the Algiers ( $36^{\circ} 47' N$ ,  $3^{\circ} 04' E$ ). It is bordered to the North by the Mediterranean Sea and the Oran Sahel, to the East by the plain of Oued Tlelat and the Sig and to South by the great sebkha Oran, with saline lands. The climate of the region is semi-arid to temperate winter. The daily temperature ranged from a mean minimum of  $11.05^{\circ} C$  in December to a mean maximum of  $26.55^{\circ} C$  in July. The total annual rainfall during the study period was 418.2 mm.

## MATERIALS AND METHODS

Our study was conducted in Oued El Atchan located at west of the Boutlélis ( $35^{\circ} 35' N$ ,  $00^{\circ} 51' O$ ). It flows from east to west and stretches in a sinusoidal about 10 kilometers. On the edges of the river extends a different type of crops, grain (barley and wheat), fodder (oats) and fruit (olive). On the banks of the river a variety of plant species have developed such as *Tamarix gallica*, *Acacia burnea* and *Nerium oleander*. We note some banks have such dense and thorny vegetation it is difficult to browse or cross but favorable for making nests. The choice of our environment study has focused on some of the river about 400 meters long and 4 km distant from the town of Boutlélis. The station was bordered to the North by the municipality of El Ancor, to West by Sidi Bakhti, to East by Boutlélis and to South by Amria. During the study a colony of Spanish Sparrow estimated at more than 2000 nests installed on this part of the river to spawn.

The catching of Spanish Sparrow *Passer hispaniolensis* was provided with a bird net (12 x 4 meters) stretched between two supports in the area. The choice of the site for the introduction of the bird net in the field was based on the abundance of food and on the availability of water in the same place. During the beginning of the spring season the net bird was installed near breeding site. Each adult Spanish sparrow captured was provided at one of its legs with a label carrying

a number. Each adult is put into a bag kraft paper accompanied by information on the location and date of capture. The adults were posed in a jar sealed with wax. Into a jar the swab ethyl acetate was posed. Death occurs 10 to 15 minutes after. The dissection occurs one to two hours after the catch adults in the laboratory to avoid decomposition especially in hot weather (Beck et al, 1995). In total 18 adults were captured in Oued El Atchane.

The breeding period of the Spanish sparrows begins in March and lasts until the end of June. During this period the nest of the Spanish sparrow was identified. These nests were posed in trees at different heights. The nests were recovered through a metal hook perch provided at its ends if they are located in high or with hand if they are near. All fledglings were taken from their nests, sacrificed (to avoid digestion of stomach contents) and categorized by age group. The fledglings were placed in small bags kraft paper with details of place and time of capture. The examination of the stomach contents were realized on 55 fledglings divided among four age groups. Of these 10 individuals aged between 1 and 3 days, 15 individuals from 4 to 6 days, 15 individuals from 7 to 9 days and 15 individuals from 10 to 12 days. All fledglings captured in the afternoon were sacrificed and stored in a cooler awaiting their dissection in laboratory. Once in the laboratory the fledglings were dissected with a scalpel. For each fledgling the content of the anterior part of the digestive tract, gizzard and crop, was triturated and dispersed in alcohol in a Petri dish containing the information of the individual.

The separation of the trophic elements of animal and plant part, a step of crushing different prey was realized using entomological pin and pliers. First we proceed to the determination of fragments such as headers, thorax, with the femurs, tibias, mandibles, elytra, trochanters, valves, tails and sets sternites and tergites. The various fragments were well distributed over the entire bottom surface of the Petri dish. Prey species were identified using a 20x dissecting scope and identification keys such as those of the Coleoptera (Perrier and Delphy, 1932; Perrier et al, 1935.), the Hymenoptera (Berland, 1940), the Orthopteroïdea (Chopard, 1943) and the insect specimens of the Pasquier and Maurel insect collections of the Department of Zoology of the Agronomic National Institute. The number of individual animal prey items in each sample was determined based on the different parts found. Paired anatomical parts with the same features were counted as belonging to one individual. A head, thorax, abdomen, two cerci, two mandibles, two elytra, two wings, two of the same antennas, or six legs corresponded to one individual. The results were assessed by relative frequency (R.F. %) which is the ratio of the number of individuals of a species or the total number of individuals of all species N (Zaime and Gautier, 1989).

## RESULTS

### Relative Frequency of Animal and Plant Part in the Diet of Spanish Sparrows

The diet of fledgling and adults Spanish sparrows was based on the animal part. The fledgling of 3 days consumes the animal part with a percentage of 91.8 % against 8.2 % for plant part. The fledgling 6 days, the animal part was consumed by 94.8 % against 5.2 % for the plant part (Table 1).

**Table 1: Relative Frequency of Animal and Plant Part Consumed by Fledglings and Adults of Spanish Sparrows in 2008 at Oran**

| Categories   | 1 to 3 Days |              | 4 to 6 Days |              | 7 to 9 Days |              | 10 to 12 Days |              | Adults     |              |
|--------------|-------------|--------------|-------------|--------------|-------------|--------------|---------------|--------------|------------|--------------|
|              | n           | R. F. %      | n           | R. F. %      | n           | R. F. %      | n             | R. F. %      | n          | R. F. %      |
| Animal part  | 101         | 91.82        | 220         | 94.83        | 184         | 95.83        | 105           | 79.55        | 115        | 79.86        |
| Plant part   | 9           | 8.18         | 12          | 5.17         | 8           | 4.17         | 27            | 20.45        | 29         | 20.14        |
| <b>Total</b> | <b>110</b>  | <b>100 %</b> | <b>232</b>  | <b>100 %</b> | <b>192</b>  | <b>100 %</b> | <b>132</b>    | <b>100 %</b> | <b>144</b> | <b>100 %</b> |

n: Number of individuals; R.F. %: Relative frequency.

In the same, the fledgling of 9 days consumes the animal part with 95.8 % against 4.2 % for the plant part. The later it increases for the fledgling of 12 days with 20.4 % against 79.6 % for the animal part. The same observation was noted for the adults with 79.9 % for the animal part against 20.1 % for the plant part (Table 1).

### Relative Frequency of Order of Arthropods in the Diet of Spanish Sparrows

The diet of the fledglings of Spanish sparrows of 3 days was composed by 9 arthropods order. The Orthoptera was the most important order with 51 preys (50.5 %), these were followed by the Coleoptera (29 preys, 28.7 %) and the Hymenoptera (12 preys, 11.9 %). The others order were consumed with a percentage included between 0.99 % (Diptera, Lepidoptera, Nevroptera, Pulmonea et Aranea) and 3.96 % for the Heteroptera. The animal's species prey consumed by the fledgling Spanish sparrows of 6 days was reported of 10 orders. In the same, the Orthoptera was the most important preys consumed with 89 preys (40.5 %), followed by the Coleoptera (44 prey, 20 %) before the Heteroptera (28 prey, 11.4 %) and the Hymenoptera (25 prey, 12.7 %). The other orders were slightly consumed (Table 2). The fledglings of 9 days belong to 8 orders. Both orders, the Coleoptera and the Hymenoptera were the most consumed prey with 62 preys (34.1 %) for each order; this was followed by Orthoptera with 30 preys (16.5 %). The other orders were consumed with a percentage understood between 1.1 % (Diptera) and 7.7 % (Hymenoptera). The prey species consumed by the fledglings of 12 days belong to 9 orders. The Coleoptera were the most consume prey with 36 preys (34.3 %), this was followed by the Orthoptera with 24 preys (22.9 %) and the Hymenoptera with 17 preys (16.2 %).

**Table 2: Relative Frequency of Order of Arthropods Found in Stomach Contents of Adults and Fledglings of Spanish Sparrows at Oran in 2008**

| Orders       | 1 to 3 Days |              | 4 to 6 Days |              | 7 to 9 Days |              | 10 To 12 Days |              | Adults     |              |
|--------------|-------------|--------------|-------------|--------------|-------------|--------------|---------------|--------------|------------|--------------|
|              | n           | R.F. %       | n           | R.F. %       | n           | R.F. %       | n             | R.F. %       | n          | R.F. %       |
| Coleoptera   | 29          | 28.71        | 44          | 20.0         | 62          | 34.07        | 36            | 34.29        | 24         | 20.87        |
| Hymenoptera  | 12          | 11.88        | 25          | 11.4         | 62          | 34.07        | 17            | 16.19        | 63         | 54.78        |
| Heteroptera  | 4           | 3.96         | 28          | 12.7         | 6           | 3.30         | 10            | 9.52         | 4          | 3.48         |
| Orthoptera   | 51          | 50.49        | 89          | 40.5         | 30          | 16.48        | 24            | 22.86        | 2          | 1.74         |
| Diptera      | 1           | 0.99         | 3           | 1.4          | 2           | 1.10         | -             | -            | 2          | 1.74         |
| Lepidoptera  | 1           | 0.99         | 2           | 0.9          | 1           | 0.55         | 1             | 0.95         | -          | -            |
| Dermaptera   | -           | -            | 22          | 10.0         | 14          | 7.69         | 8             | 7.62         | 2          | 1.74         |
| Nevroptera   | 1           | 0.99         | -           | -            | -           | -            | -             | -            | -          | -            |
| Pulmonea     | 1           | 0.99         | 4           | 1.8          | 7           | 3.85         | 2             | 1.90         | 17         | 14.78        |
| Aranea       | 1           | 0.99         | 2           | 0.9          | -           | -            | -             | -            | 1          | 0.87         |
| Phalangida   | -           | -            | 1           | 0.5          | -           | -            | 6             | 5.71         | -          | -            |
| Solifuga     | -           | -            | -           | -            | -           | -            | 1             | 0.95         | -          | -            |
| <b>Total</b> | <b>101</b>  | <b>100 %</b> | <b>220</b>  | <b>100 %</b> | <b>184</b>  | <b>100 %</b> | <b>105</b>    | <b>100 %</b> | <b>115</b> | <b>100 %</b> |

n: Number of individuals ; R. F. %: Relative frequency; (-): order absent.

The others orders were consumed by a percentage included between 0.95 % (Lepidoptera and Solifuga) and 9.5 % (Heteroptera). As for adults the Hymenoptera made up in first order with 63 preys (54.8 %), The Coleoptera was the next most important prey with 24 preys (20.9 %), followed by Pulmonea with 17 preys (14.8 %). Consequently the Coleoptera, the Orthoptera and the Hymenoptera were the most important prey in the diet of fledglings. On the other hand the diet of adults Spanish sparrows was composed by the Hymenoptera, the Coleoptera and the Pulmonea (Table 2).

### Relative Frequency of Species Preys in the Diet of Spanish Sparrows

The diet of fledglings of Spanish sparrows of 3 days was composed by 25 species preys. The dominant species was *Pezotettix giornai*, which comprised 31.7 % of the diet, followed by *Calliptamus* sp. and *Anisoplia* sp. (14.9 % each).

The remaining prey's species made up less than 7.9 % of the diet (Table 3). The dominant species in the diet of nestling Spanish sparrows of 6 days was *Calliptamus* sp. (16.8 %) among 47 species preys identified. This was followed by *Anisoplia* sp. (11.4 %), *Pezotettix giornai* (9.1 %), *Messor barbara* (8.6 %), *Forficula auricularia* (6.8 %) and *Platycleis* sp. (6.4 %). Other species preys were consumed with percentage understood between 0.45 and 3.2 %. The diet of nestling Spanish sparrows of 9 days was composed by 34 species preys. *Messor barbara* was the dominant species eaten (33.5 %), it was followed by *Tropinota squalida* (16.5 %). Other preys eaten were *Anisoplia* sp, *Platycleis* sp. and *Anisolabis mauritanicus* (6.6 % each).

**Table 3: Relative Frequency (R. F. %) of Preys Consumed by Adults and Fledglings of Spanish Sparrows in 2008 at Oran**

| Orders      | Species                              | 1 to 3 Days |        | 4 to 6 Days |        | 7 To 9 Days |        | 10 To 12 Days |        | Adults |        |
|-------------|--------------------------------------|-------------|--------|-------------|--------|-------------|--------|---------------|--------|--------|--------|
|             |                                      | n           | RF (%) | n           | RF (%) | n           | RF (%) | n             | RF (%) | n      | RF (%) |
| Coleoptera  | <i>Anisoplia</i> sp.                 | 15          | 14.85  | 25          | 11.36  | 12          | 6.59   | 17            | 16.19  | 5      | 4.35   |
|             | <i>Tropinota squalida</i>            | 8           | 7.92   | 4           | 1.82   | 32          | 16.48  | 8             | 7.62   | -      | -      |
|             | <i>Sphenoptera</i> sp.               | -           | -      | 3           | 1.36   | -           | -      | 0             | 0      | -      | -      |
|             | <i>Cetonia</i> sp.                   | 1           | 0.99   | -           | -      | 8           | 4.40   | 1             | 0.95   | 3      | 2.61   |
|             | <i>Cassida ferruginea</i>            | 1           | 0.99   | -           | -      | -           | -      | -             | -      | -      | -      |
|             | <i>Orthomus</i> sp.                  | 1           | 0.99   | -           | -      | -           | -      | -             | -      | -      | -      |
|             | <i>Hypera</i> sp.                    | -           | -      | 1           | 0.45   | -           | -      | -             | -      | -      | -      |
|             | <i>Lixus</i> sp.                     | -           | -      | 3           | 1.36   | -           | -      | -             | -      | -      | -      |
|             | <i>Larinus</i> sp.                   | -           | -      | 1           | 0.45   | 1           | 0.55   | 1             | 0.95   | -      | -      |
|             | <i>Agapanthia</i> sp.                | -           | -      | 1           | 0.45   | -           | -      | -             | -      | -      | -      |
|             | <i>Cerambycidae</i> sp. und.         | -           | -      | 2           | 0.91   | 1           | 0.55   | 2             | 1.90   | 3      | 2.61   |
|             | <i>Cassida</i> sp.                   | -           | -      | -           | -      | 1           | 0.55   | -             | -      | 1      | 0.87   |
|             | <i>Elateridae</i> sp.und.            | -           | -      | -           | -      | 1           | 0.55   | -             | -      | -      | -      |
|             | <i>Buprestidae</i> sp.und.           | -           | -      | -           | -      | 1           | 0.55   | -             | -      | -      | -      |
|             | <i>Omophlus</i> sp.                  | -           | -      | -           | -      | -           | -      | 2             | 1.90   | -      | -      |
|             | <i>Coccinella algerica</i>           | -           | -      | 1           | 0.45   | 2           | 1.10   | -             | -      | -      | -      |
|             | <i>Coccinellidae</i> sp. und.        | -           | -      | -           | -      | 2           | 1.10   | -             | -      | -      | -      |
|             | <i>Curculionidae</i> sp. 1 und.      | 2           | 1.98   | 3           | 1.36   | 1           | 0.55   | 1             | 0.95   | 6      | 5.22   |
|             | <i>Curculionidae</i> sp. 2 und.      | 1           | 0.99   | -           | -      | -           | -      | 1             | 0.95   | 2      | 1.74   |
|             | <i>Curculionidae</i> sp. 3 und.      | -           | -      | -           | -      | -           | -      | -             | -      | 1      | 0.87   |
|             | <i>Curculionidae</i> sp. 4 und.      | -           | -      | -           | -      | -           | -      | -             | -      | 1      | 0.87   |
|             | <i>Brachyderes</i> sp.               | -           | -      | 2           | 0.91   | 1           | 0.55   | -             | -      | 2      | 1.74   |
|             | <i>Caraboidea</i> sp. 1 und.         | -           | -      | -           | -      | -           | -      | 1             | 0.95   | 1      | 0.87   |
|             | <i>Caraboidea</i> sp. 2 und.         | -           | -      | -           | -      | -           | -      | 2             | 1.90   | 1      | 0.87   |
|             | <i>Harpalus</i> sp.                  | -           | -      | -           | -      | 1           | 0.55   | -             | -      | -      | -      |
| Hymenoptera | <i>Messor barbara</i>                | 8           | 7.92   | 19          | 8.64   | 61          | 33.52  | 12            | 11.43  | 56     | 48.70  |
|             | <i>Messor</i> sp.                    | -           | 0      | 1           | 0.45   | -           | -      | -             | -      | -      | -      |
|             | <i>Formicidae</i> sp. und.           | 1           | 0.99   | -           | -      | -           | -      | 1             | 0.95   | -      | -      |
|             | <i>Cataglyphis bicolor</i>           | -           | -      | 2           | 0.91   | -           | -      | -             | -      | 3      | 2.61   |
|             | <i>Aphaenogaster testaceo-pilosa</i> | -           | -      | 1           | 0.45   | -           | -      | -             | -      | 3      | 2.61   |
|             | <i>Tetramorium biskrensis</i>        | 2           | 1.98   | -           | -      | -           | -      | -             | -      | -      | -      |
|             | <i>Tapinoma nigerrimum</i>           | -           | 0      | 1           | 0.45   | 1           | 0.55   | -             | -      | 1      | 0.87   |
|             | <i>Anthophoridae</i> sp. und.        | 1           | 0.99   | -           | -      | -           | -      | -             | -      | -      | -      |
|             | <i>Vespoidea</i> sp. und.            | -           | -      | 1           | 0.45   | -           | -      | -             | -      | -      | -      |
|             | <i>Megachelidae</i> sp. und.         | -           | -      | -           | -      | -           | -      | 2             | 1.90   | -      | -      |
| Heteroptera | <i>Apoidea</i> sp. und.              | -           | -      | -           | -      | -           | -      | 2             | 1.90   | -      | -      |
|             | <i>Eurygaster</i> sp.                | 1           | 0.99   | 3           | 1.36   | 1           | 0.55   | 4             | 3.81   | -      | -      |
|             | <i>Lygaeidae</i> sp. und.            | 1           | 0.99   | -           | 0.00   | -           | -      | 2             | 1.90   | 1      | 0.87   |
|             | <i>Jassidae</i> sp. und.             | 1           | 0.99   | 2           | 0.91   | -           | -      | -             | -      | -      | -      |

|              |                                     |            |            |            |            |            |            |            |            |            |            |
|--------------|-------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
|              | <i>Scioceris</i> sp.                | 1          | 0.99       | 2          | 0.91       | -          | -          | 1          | 0.95       | 1          | 0.87       |
|              | <i>Strachia oleracea</i>            | -          | -          | 7          | 3.18       | -          | -          | -          | -          | -          | -          |
|              | <i>Carpocoris nigricornis</i>       | -          | -          | 4          | 1.82       | 3          | 1.65       | -          | -          | -          | -          |
|              | <i>Carpocoris</i> sp.               | -          | -          | 1          | 0.45       | -          | -          | -          | -          | -          | -          |
|              | <i>Odontoscelis</i> sp.             | -          | -          | 3          | 1.36       | -          | -          | 1          | 0.95       | -          | -          |
|              | <i>Sehirus</i> sp.                  | -          | -          | 3          | 1.36       | -          | -          | -          | -          | -          | -          |
|              | Pentatominae sp. und.               | -          | -          | 1          | 0.45       | 1          | 0.55       | -          | -          | -          | -          |
|              | Coreidae sp. und.                   | -          | -          | 2          | 0.91       | -          | -          | -          | -          | 1          | 0.87       |
|              | <i>Aelia</i> sp.                    | -          | -          | -          | -          | 1          | 0.55       | 2          | 1.90       | 1          | 0.87       |
|              |                                     |            |            |            |            |            |            |            |            |            |            |
| Orthoptera   | <i>Platycleis</i> sp.               | 1          | 0.99       | 14         | 6.36       | 12         | 6.59       | 5          | 4.76       | -          | -          |
|              | <i>Pezotettix giornai</i>           | 32         | 31.68      | 20         | 9.09       | 8          | 4.40       | 1          | 0.95       | -          | -          |
|              | <i>Calliptamus</i> sp.              | 15         | 14.85      | 37         | 16.82      | 2          | 1.10       | 5          | 4.76       | -          | -          |
|              | Acrididae sp. 1 und.                | 1          | 0.99       | -          | -          | -          | -          | 3          | 2.86       | 1          | 0.87       |
|              | Acrididae sp. 2 und.                | -          | -          | -          | -          | 2          | 1.10       | 3          | 2.86       | -          | -          |
|              | Ensifera sp. 1 und.                 | 2          | 1.98       | 5          | 2.27       | 3          | 1.65       | 3          | 2.86       | -          | -          |
|              | Ensifera sp. 2 und.                 | -          | -          | 5          | 2.27       | -          | -          | -          | -          | -          | -          |
|              | Ensifera sp. 3 und.                 | -          | -          | 6          | 2.73       | -          | -          | -          | -          | -          | -          |
|              | Caelifera sp. 1 und.                | -          | -          | -          | 0          | -          | -          | 1          | 0.95       | -          | -          |
|              | Caelifera sp 2 und.                 | -          | -          | -          | 0          | -          | -          | -          | -          | 1          | 0.87       |
|              | Gryllidae sp. und.                  | -          | -          | -          | 0          | 1          | 0.55       | -          | -          | -          | -          |
|              | <i>Ocneridia</i> sp. 1              | -          | -          | 1          | 0.45       | 1          | 0.55       | 2          | 1.90       | -          | -          |
|              | <i>Ocneridia</i> sp. 2              | -          | -          | -          | 0          | 1          | 0.55       | 0          | 0.00       | -          | -          |
|              | <i>Ocneridia longicoris</i>         | -          | -          | 1          | 0.45       | -          | -          | 1          | 0.95       | -          | -          |
| Diptera      | Cyclorrhapha sp. und.               | 1          | 0.99       | 1          | 0.45       | 1          | 0.55       | -          | -          | -          | -          |
| Lepidoptera  | Noctuidae sp. 1 und.                | -          | -          | 1          | 0.45       | 1          | 0.55       | -          | -          | -          | -          |
|              | Lepidoptera sp. 1 und.              | 1          | 0.99       | 1          | 0.45       | -          | -          | -          | -          | -          | -          |
|              | Lepidoptera sp. 2 und.              | -          | -          | -          | -          | -          | -          | 1          | 0.95       | -          | -          |
| Dermoptera   | <i>Forficula auricularia</i>        | -          | -          | 15         | 6.82       | 2          | 1.10       | 4          | 3.81       | 1          | 0.87       |
|              | <i>Anisolabis mauritanicus</i>      | -          | -          | 6          | 2.73       | 12         | 6.59       | 4          | 3.81       | 1          | 0.87       |
|              | <i>Labia minor</i>                  | -          | -          | 1          | 0.45       | -          | -          | -          | -          | -          | -          |
| Nevroptera   | Myrmeleonidae sp. und.              | 1          | 0.99       | -          | -          | -          | -          | -          | -          | -          | -          |
| Pulmonea     | <i>Helicella virgata</i>            | 1          | 0.99       | 1          | 0.45       | 1          | 0.55       | -          | -          | -          | -          |
|              | Helicidae sp. 1 und.                | -          | -          | 2          | 0.91       | 3          | 1.65       | 1          | 0.95       | 3          | 2.61       |
|              | Helicidae sp. 2 und.                | -          | -          | 1          | 0.45       | 2          | 1.10       | -          | -          | 3          | 2.61       |
|              | <i>Sphincterochila candidissima</i> | -          | -          | -          | -          | -          | -          | 1          | 0.95       | -          | -          |
|              | <i>Cochlicella</i> sp.              | -          | -          | -          | -          | -          | -          | -          | -          | 11         | 9.57       |
| Aranea       | Aranea sp. und.                     | 1          | 0.99       | -          | -          | -          | -          | -          | -          | -          | -          |
|              | Dysderidae sp. 1 und.               | -          | -          | 2          | 0.91       | -          | -          | -          | -          | 1          | 0.87       |
| Phalangida   | Phalangida sp. 1 und.               | -          | -          | 1          | 0.45       | -          | -          | 5          | 4.76       | -          | -          |
|              | Phalangida sp. 2 und.               | -          | -          | -          | -          | -          | -          | 1          | 0.95       | -          | -          |
| Solifuga     | Solifugea sp. und.                  | -          | -          | -          | -          | -          | -          | -          | 1          | 0.95       | -          |
| <b>Total</b> |                                     | <b>101</b> | <b>100</b> | <b>220</b> | <b>100</b> | <b>184</b> | <b>100</b> | <b>105</b> | <b>100</b> | <b>115</b> | <b>100</b> |

n: Number of individuals ; R.F. %: Relative frequency; sp. und.: species undetermined; (-): species absent.

The diet of fledgling Spanish sparrows of 12 days was composed by 36 species *Anisoplia* sp. was the most dominant species preys (16.2 %). It was followed by *Messor barbara* (11.4 %) and *Tropinota squalida* (7.6 %). The adults Spanish sparrows, *Messor barbara* was the most dominant species eaten (48.7 %). Other prey eaten were *Cochlicella* sp. (9.6 %), Curculionidae sp. 1 und. (5.2 %) and *Anisoplia* sp. (4.4 %) (Table 3).

## DISCUSSIONS AND CONCLUSIONS

The diet of the nestling and adults Spanish Sparrow was characterized by the dominance of the animal part. The diet of fledgling was based on the animal part (79.6% to 95.8%). On the other hand the plant part was consumed with a percentage included between 4.2% and 20.5%. The same observation was noted for adults with 79.9% for the animal part

against 20.1% for plant part. Metzmacher (1983) reported that fledglings Spanish sparrows are omnivorous with insectivorous marked tendency. Their vegetarian trend continues to the end of breeding. According to Bachkiroff (1953), among young Spanish sparrows insects are always present in all the gizzards examined, but in proportion decreasing from hatching to adulthood.

The diet of the fledglings of Spanish sparrows of 3 days was composed by 9 arthropods order. The Orthoptera was the most important order with 51 preys (50.5 %). It was followed by the Coleoptera (29 preys, 28.7 %) and the Hymenoptera (12 preys, 11.9 %). These results differ by those found by Koudjil (1982) which notes in Mitidja area that Coleoptera are most ingested by young sparrows with an age from 1 to 3 days (51.7%), followed by the Homoptera (20.7 %). Metzmacher (1985), who studied in Oran also says that young Spanish Sparrow of first age ingested 89.4% of Orthoptera in Oued Mediouni, 46 % in Valley Oued Atchan, 43.9 in Ain El Berd. Elsewhere at Missergin the Coleoptera (17.5%) and Heteroptera (14.4%) in May and Diptera (27.2%) in June were the most consumed prey. However Ait Belkacem (2000) also reported that the Homoptera (21.2 %) are the most requested by the fledglings with age from 1 to 3 days, followed by Coleoptera. This author noted that the three categories of older nestlings consume mostly Coleoptera. The fledgling Spanish sparrow with age from 1 to 3 days consumes Homoptera Jassidae and Coleoptera Chrysomelidae preferably according to Koudjil (1982).

The animal's species prey consumed by the fledgling Spanish sparrows of 6 days was reported of 10 orders. In the same, the Orthoptera was the most important preys consumed with 89 preys (40.5 %), followed by the Coleoptera (44 prey, 20 %) before the Heteroptera (28 prey, 11.4 %) and the Hymenoptera (25 prey, 12.7 %). The importance of Orthoptera Ensifera prey in the diet of fledgling with age from 4 to 6 days was also confirmed by Koudjil (1982). Similarly in Tunisia Bortoli (1969) noted that Orthoptera was most consumed by fledgling of Spanish sparrows (5 to 6 days).

The fledglings of 9 days belong to 8 orders. Both orders, the Coleoptera and the Hymenoptera were the most consumed prey with 62 preys (34.1 %) for each order; this was followed by Orthoptera with 30 preys (16.5 %). The other orders were consumed with a percentage understood between 1.1 % (Diptera) and 7.7 % (Hymenoptera). The prey species consumed by the fledglings of 12 days belong to 9 orders. The Coleoptera were the most consume prey with 36 preys (34.3 %), this was followed by the Orthoptera with 24 preys (22.9 %) and the Hymenoptera with 17 preys (16.2 %). AKROUF et al. (2000) reported that the diet of Hybrid sparrows with age of 10 days in El Harrach area (near Algiers) was composed by Coleoptera (37.3%). Metzmacher (1985) noted that the diet of fledgling of Spanish sparrows in the Oran area was dominated by Orthoptera, this was followed by Heteroptera. Ould Rabah et al. (2007) after analyzing of stomach of 26 fledglings with age from 9 to 12 days in Chlef area reported that Orthoptera was the most consumed prey with 84.9%. This was followed by Hymenoptera (6.9 %). In the south of Portugal Marques et al. (2003), reported that the diet of 157 fledglings with age from 5 to 10 days was characterized by the dominance of Lepidoptera (32.7 %) and Orthoptera (26.0%).

As for adults the Hymenoptera made up in first order with 63 preys (54.8 %). The Coleoptera was the next most important prey with 24 preys (20.9 %), followed by Pulmonea with 17 preys (14.8 %). Koudjil (1982) noted that males and females hybrid sparrows ate Insecta and Gastropoda. The consumption of Gasteropoda Pulmonea by adults can be explained by the need for calcium in the female for egg formation. The diet of fledglings of Spanish sparrows of 3 days was composed by 25 species preys. The dominant species was *Pezotettix giornai*, which comprised 31.7 % of the diet, followed by *Calliptamus* sp. and *Anisoplia* sp. (14.9 % each). The dominant species in the diet of nestling Spanish

sparrows of 6 days was *Calliptamus* sp. (16.8 %) among 47 species preys identified. This was followed by *Anisoplia* sp. (11.4 %), *Pezotettix giornai* (9.1 %), *Messor barbara* (8.6 %), *Forficula auricularia* (6.8 %) and *Platycleis* sp. (6.4 %). Koudjil (1982) reported that fledgling with age from 4 to 6 days was composed by Orthoptera Ensifera prey. According to Metzmacher (1985) the diet of fledgling Spanish sparrows ranging from hatching until the 6th or 8th day in the nest was based on the Orthoptera (locusts especially), the Heteroptera, the Coleoptera (Coccinellidae and Curculionidae) and the Dermaptera.

The diet of nestling Spanish sparrows of 9 days was composed by 34 species preys. *Messor barbara* was the dominant species eaten (33.5 %), it was followed by *Tropinota squalida* (16.5 %). The diet of fledgling Spanish sparrows of 12 days was composed by 36 species *Anisoplia* sp. was the most dominant species preys (16.2 %). It was followed by *Messor barbara* (11.4 %) and *Tropinota squalida* (7.6 %). In Chlef area Ould Rabah et al. (2007) reported that the diet of 26 fledglings with age from 9 to 12 days was composed by *Platycleis grizea* with 99 individuals (45.4%), followed by *Calliptamus* sp. with 25 individuals (11.5%).

The adults Spanish sparrows, *Messor barbara* was the most dominant species eaten (48.7 %). Doumandji and Doumandji-Mitiche (1992) reported that the House Sparrow captures ants *Messor barbara* especially in full spin. So we can say that in general the sparrows feed their chicks in categories 1 and 2 by prey too hard and strong constituent such as Orthoptera but from age 3 this diet will be change in favor of Coleoptera, Dermaptera, Heteroptera and Hymenoptera. The diet of adults was composed by Hymenoptera especially winged ants. Essentially through this manuscript the reader's attention should be drawn to the fact that the destruction of nests and broods should not realized in the 8th or 9th day from hatching but later in the 11th or even 12th day.

## REFERENCES

1. Ait Belkacem, A. (2000). *Le moineau hybride Passer domesticus x P. hispaniolensis dans la banlieue d'El Harrach: Reproduction, disponibilités trophiques et régime alimentaire*. Mémoire Ing. agro, Inst. nati. agro, El Harrach, 151 p.
2. Akrouf, F. (1999). *Aperçu sur la bioécologie et les dégâts des moineaux (Passer Brisson) à l'institut national agronomique d'El Harrach et à Oued Smar*. Mémoire Ing. agro, Inst. nati. agro, El Harrach, 168 p.
3. Akrouf, F, Ait Belkacem, A. & Doumandji, S. (2002). Place des Arthropodes dans le régime alimentaire des jeunes moineaux hybrides *Passer domesticus* X *P. hispaniolensis* (Aves, Passeridae) au nid et amélioration proposée dans la lutte contre ces prédateurs des cultures – Deuxième note. 6<sup>ème</sup> journée Ornithologie, 11 mars 2002, Dép. Zool. agri. for, Inst. nati. agro, El Harrach, p. 10.
4. Akrouf, F, Doumandji, S. & Bendjoudi, D. (2000). Aperçu sur le régime alimentaire des jeunes moineaux hybrides *Passer domesticus* X *P. hispaniolensis* au nid. 5<sup>ème</sup> journée Ornithologie. 18 avril 2000, Dep. Zool. agri. for. Inst. nati. agro. El Harrach, p. 18.
5. Bachkiroff, Y. (1953). *Le moineau steppique au Maroc*. Serv. def. vég. Rabat, 135 p.
6. Behidj, N. (1997). *Bioécologie de l'avifaune en céréaliculture – Estimation de dégâts dus aux moineaux à Oued Smar. Ethologie du moineau dans un parc d'El Harrach*. Thèse Magister, Inst. nati. agro, El Harrach, 205 p.
7. Bellatreche, M. (1979). *Contribution à l'étude des moineaux Passer domesticus L, Passer hispaniolensis Temm*,

*leurs hybrides, et leurs dégâts dans la Mitidja.* Thèse Ing. agro, Inst. nati. agro, El Harrach, 85 p.

8. Bellatreche, M. (1983). *Contribution à l'étude des oiseaux des écosystèmes de la Mitidja - une attention particulière étant portée à ceux du genre Passer Brisson: biologie, écoéthologie, impacts agronomiques et économiques, examen critique des techniques de lutte.* Thèse Magister, Inst. nati. agro, El Harrach, 140 p.
9. Bellatreche, M. (1986). Approche économique des dégâts aviaires en Algérie. *Ann. Inst. nati. agro, El Harrach*, Vol. 10, (1): 181 – 192.
10. Bendjoudi, D. (1999). *Biosystématique et éco-éthologie des moineaux du genre Passer Brisson, 1760 – Analyse biométrique, régime alimentaire et estimation des dégâts dans la partie orientale de la Mitidja.* Thèse Magister, Inst. nati. agro, El Harrach, 197 p.
11. Berket, B. (2010). Place des arthropodes utiles et nuisibles dans le régime alimentaire du moineau espagnol *passer hispaniolensis* (Temm, 1820) dans la région Oranaise (Boutlelis) Thèse Ing. Agro, Univ. Blida, 104 p.
12. Berland, L. (1940). *La faune de la France, Hymenoptères in PERRIER R.* Ed. Librairie Delagrave, Paris, T. 7, 211 p.
13. Berville, P. & Gauthier, J.L. (1961). Un oiseau parfois très nuisible, le moineau, *Phytoma, Déf. cult*, (133): 15 – 20.
14. Bortoli, L. (1969). *Contribution à l'étude du problème des oiseaux granivores en Tunisie.* Bull. Fac. agro. (E. N. S. A. T.), (22-23): 33 - 153.
15. Boukhemza, M. (1990). *Contribution à l'étude de l'avifaune de la région de Timimoun (Gourara): Inventaire et données bioécolologiques.* Thèse Magister, Inst. nati. agro, El Harrach, 117 p.
16. Chopard, L. (1943). Orthopteroïdes de l'Afrique du nord. Ed. Larose, Paris, Coll. "Faune de l'empire français", I, 450 p.
17. Cramp, S, Brooks, DJ, Dunn, E, Gillmor, R, Hall-Craggs, I, Hollom, P. A. D, Nicholson, E. M, Ogilvie, M. A, Roselaar, C. S, Sellar, P. J, Simmons, K. E. L, Voous, K.H. and Wallac, D. I. M. (1994). *Hand book of the birds of Europe, the middle east and North Africa.* Ed. Univ. press, Oxford, Vol. 8: 288 – 320.
18. Doumandji, S. & Doumandji-Mitiche, B. (1992). Relations trophiques insectes-oiseaux dans un parc du littoral algérois (Algérie). *Alauda*, 60 (4): 274 – 275.
19. Guezoul, O, Sekour, M, Soutou, K. & Doumandji, S. (2011). Estimation des dégâts dus aux Moineau hybride *Passer domesticus x Passer hispaniolensis* sur les dattes (*Phoenix dactylifera*) dans deux palmeraies à Ouargla. *Lebanese Science Journal*, 11 (2): 3 – 9.
20. Koudjil, M. (1982). *Etude du régime alimentaire des moineaux Passer domesticus L, Passer hispaniolensis Temm. et leurs hybrides. Essais de lutte par appâtage contre ces déprédateurs dans la Mitidja.* Thèse Ing. agro, Inst. nati. agro, El Harrach, 102 p.
21. Ledant, J.-P, Jacob, J. P, Jacobs, P, Macher, F, Ochando, B. & Roche, J. (1981). Mise à jour de l'avifaune algérienne. *Le Gerfault-de Giervalk, Bruxelles*: 295 – 398.

22. Madagh, M. A. (1996). *Impacts agronomiques et économiques dus aux moineaux dans une exploitation agricole de la Mitidja et perspectives*. Thèse Magister, Inst. nati. agro, El Harrach, 120 p.
23. Marques, M. P, Boieiro, M, Canário, F. & Vicente, L. (2003). Variation of nestling diet across the breeding season in spanish sparrow *Passer hispaniolensis* in southern Portugal, *Ardeola* 50(1), pp 71-75.
24. Metzmacher, M. (1983). Le menu des jeunes moineaux domestiques *Passer domesticus* L. et espagnols *Passer hispaniolensis* Temm. en Oranie (Algérie). *Cah. Éthol. Appl.*, Vol. 3, (2): 191 – 214.
25. Metzmacher, M. (1985). *Stratégies adaptatives des oiseaux granivores dans une zone semi-aride. Le cas des moineaux domestiques Passer domesticus L. et des moineaux espagnols Passer hispaniolensis Temm.* Thèse Doctorat ès-sci. zool, Univ. Liège, 220 p.
26. Metzmacher, M. & Dubois, D. (1981). Estimation des dégâts causés par les oiseaux aux céréales en Algérie. *Rev. écol. (Terre et vie)*, (35): 381 – 395.
27. Otmani, M. (2013). Etude comparative du comportement trophique des jeunes et adultes du moineau espagnol (*Passer hispaniolensis*) dans deux régions céréaliers l'une à Chlef et l'autre à Tiaret, Thèse, Ing. Agro, Univ. Blida, 99 p.
28. Ould Rabah, I. (2002). Nouvelle offensive contre les moineaux. *Bull. info. Prot. Plan, info. Phyto, El Harrach*, (4): 4.
29. Ould Rabah, I. & Doumandji, S. (2005). Seconde note sur l'évaluation et la répartition des colonies du Moineau espagnol *Passer hispaniolensis* en Algérie. 9ème Journée Ornithologie, 7 mars 2005, Lab. Ornith, Dép. Zool. agri. for, Inst. nati. agro, El Harrach: p. 31.
30. Ould Rabah, I, Doumandji, S. & Guezoul, O. (2007). Première note sur le régime alimentaire des jeunes moineaux espagnols *Passer hispaniolensis* dans oliveraie à Chlef. 11<sup>ème</sup> Journée Ornithologie, 9 avril 2007, Lab. Ornith, Dép. Zool. agri. for, Inst. nati. agro, El Harrach, p. 42.
31. Perrier, R. and Delphy, J. (1932). *La faune de la France – Coléoptères (deuxième partie)*. Ed. Librairie Delagrave, Paris, fasc. 6, 229 p.
32. Perrier, R, Bertin, L. & Gaumont, L. (1935). La faune de la France – Hémiptères, Anoploures, Mallophages, Lépidoptères. Ed. Librairie Delagrave, Paris, Fasc. 4, 243 p.
33. Seddiki, D. (1990). *Contribution à l'étude des mammifères et des oiseaux du massif de la Tafedest (Ahaggar)*. Thèse, Ing. agro, Inst. nati. agro. El Harrach, 64 p.
34. Sefraoui, M. (1981). *Etude de quelques aspects de la biologie des principales espèces d'oiseaux nuisibles aux cultures dans la Mitidja*. Thèse Ing. agro, Inst. nati. agro, El Harrach, 78 p.
35. Siriez, H. (1966). Les oiseaux et l'agriculture. Ed. Sep, Paris, 236 p.
36. Zaime, A. and Gautier, J.Y. (1989). Comparaison des régimes alimentaires de trois espèces sympatriques de *Gerbillidae* en milieu saharien au Maroc. *Rev. Ecol. (Terre et Vie)*, T. 44, (3): 153 – 163.